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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/614,019

07/08/2003

Yo Taniguchi

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9504

20457

7590

01/11/2007

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EXAMINER

CHENG, JACQUELINE

ART UNIT

PAPER NUMBER

3768

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/11/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/614,019		TANIGUCHI ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Jacqueline Cheng		3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 August 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. The objection of claim 21 has been overcome and the examiner withdraws this objection.
2. Applicant's arguments filed August 3, 2006 have been fully considered but they are not persuasive. The applicant argues that all the claims patentable distinguish over the combination of Hardy and Gupta, however the examiner respectfully disagrees with the applicant. Hardy discloses that the comparison step of using two-dimensional cross correlation is used to speed up the computation (processing time). Although Hardy does not expressly disclose that the similarity coefficient is used to decide which images are kept, Hardy does disclose the functional equivalence of using a cross correlation comparison step to compare the current image to the reference image. Besides that, Gupta teaches a method of sorting out the unwanted data by using the correlation coefficient cut-off of 0.95 to minimize the inclusion of vessel voxels to show that to use a similarity coefficient to compare and discard data is well known in the art and is not a hindsight reconstruction as Hardy discloses that the comparison step can be performed in accordance with other known techniques of ranking and sorting (col. 5 line 37-39). Since the examiner believes Hardy and Gupta teaching the similarity coefficient, the combination of Hardy, Gupta, and Heid still stand as overcoming claims 13-19.
3. The examiner does recognize that Gupta and Hardy utilized ECG-gated scan, and that the applicant states that that is not utilized in accordance with the present invention, but the examiner does not believe that the importance of not using the ECG-gated scan is not reflected in the body of the claims, only that a reference projection is taken while the patient is not breathing and

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projection image is taken in the state that the living body breathes. These limitations are reflected in the teachings of Hardy in view of Gupta.

4. Therefore, the rejection as stated in the office action dated May 4, 2006 and repeated below still stands.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-12, 20 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,980,846 B2 (herein referred to as Hardy et al.) in view of US Patent No. 6,687,528 B2 (herein referred to as Gupta et al.). Hardy et al. discloses a method for acquiring image data from a subject with an MRI system. It is well known to one skilled in the art at the time of the invention that an MRI system inherently comprises an RF coil for generating an RF magnetic field, a main static magnet (in which a subject is placed in) providing a static magnetic field, gradient coils (usually 3) to create magnetic field gradients and a controller to control the pulse sequences. In particular, Hardy et al. discloses an MRI system that acquires a reference data set of a region of interest, such as the motion of the heart or the heartbeat (col. 1 line 27-33), and then acquires a plurality of free-breathing data sets of this region of interest. The free-breathing data sets are then compared with the reference data set to be used in creating an image of the region of interest (col. 1 line 60-67).

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In one embodiment of Hardy et al. it is disclosed that the reference data set is taken during a single breath-held time period (which could be either after inhaling or after exhaling) (col. 4 line 1-3). The comparison between the reference and free-breathing images are done through cross-correlations to decide which images should be kept and which are thrown away. If the feature of interest is present in any of the free-breathing images then the cross-correlation will reveal a strong central peak, if not, then the central peak will be offset. Even though Hardy et al. does not expressly disclose setting a threshold, to determine which images to reject there has to be some sort of threshold set. The amount of this threshold could be  $1/m$  away from the 1,  $m$  being greater than 2. Being closer to the 1.0 correlation (having a greater  $m$  value) would result in a more precise image reconstruction (col. 5 line 11-45).

Although this comparison is not done by using a similarity coefficient in particular, the results of the similarity coefficient and the cross-correlation are the same, the strong central peaks corresponding to the 1.0 correlations. Besides the fact that it would be obvious to use any sort of comparison method to obtain the proper images, Gupta et al. discloses using correlation coefficients to determine the proper images to use with a cut-off ( $R_{th}$ ) of 0.95 (col. 50-55). It would be obvious to one with ordinary skill in the art at the time of the invention to combine Gupta et al. with Hardy et al. as both inventions are related to MR imaging of moving organs and using ECG-gated scans to minimize noise.

As for the controller controlling the specific sequences claimed, a controller has control over the pulses, so therefore has control to create any sequence of pulse wanted.

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7. **Claims 13-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hardy et al. in view of Gupta et al., and further in view of US Patent No. 5,668,474 (herein referred to as Heid). Hardy et al. discloses most of the invention claimed as described above as well as performing Fourier transformation to obtain reconstructions of the images (col. 1 line 27-28, col. 2 line 58-61). It would be obvious to one with ordinary skill in the art at the time of the invention to perform a Fourier transform of any data that needs to be reconstructed into an image at no matter what point in the sequence.

What Hardy et al. does not disclose is the alternating polarity of the pulse sequence. Heid discloses a pulse sequence in which the readout magnetic field gradient and the phase-encoding magnetic field has alternating polarities (figure 1-4, col. 1 line 47-65). It would be obvious to one with ordinary skill in the art at the time of the invention to combine Heid with Hardy et al. and Gupta et al. as Heid discloses a pulse sequence for use in NMRI. Any pulse sequence can be applied to an MRI system, such as the MRI system of Hardy et al.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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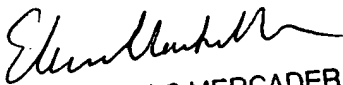
CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacqueline Cheng whose telephone number is 571-272-5596. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni Mantis-Mercader can be reached on 571-272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JC

  
ELENI MANTIS MERCADER  
SUPERVISORY PATENT EXAMINER